

What is claimed is:

1. A method of manufacturing a carbon nanotube semiconductor device, comprising:

5 dropping a solution containing a carbon nanotube with conductor property and a carbon nanotube with semiconductor property onto a first electrode, a second electrode, and a region between the first electrode and the second electrode overlapped with the third electrode through the insulating film while an alternating current voltage is applied between the first electrode and the second electrode which
10 are located over an insulating film over a third electrode;

 controlling the carbon nanotubes in a predetermined alignment direction;
and

 applying a direct current voltage between the first electrode and the second electrode to remove the carbon nanotube with conductor property,

15 wherein the first electrode is connected with the second electrode through the carbon nanotube with semiconductor property in the carbon nanotube semiconductor device.

2. A method of manufacturing a carbon nanotube semiconductor device
20 according to claim 1, further comprising rubbing a surface of the first electrode, a surface of the second electrode, and a surface of the insulating film between the first electrode and the second electrode overlapped with the third electrode.

3. A method of manufacturing a carbon nanotube semiconductor device
25 according to claim 1, further comprising:

 forming an alignment film over the first electrode, the second electrode, and

the insulating film between the first electrode and the second electrode; and
rubbing a surface of the alignment film.

4. A method of manufacturing a carbon nanotube semiconductor device,
5 comprising:

dropping a solution containing a carbon nanotube with conductor property
and a carbon nanotube with semiconductor property onto a first electrode, a second
electrode, and a region between the first electrode and the second electrode;

controlling the carbon nanotubes in a predetermined alignment direction
10 while an alternating current voltage is applied between the first electrode and the
second electrode;

applying a direct current voltage between the first electrode and the second
electrode to remove the carbon nanotube with conductor property;

forming an insulating film so as to cover the carbon nanotube with
15 semiconductor property; and

forming a third electrode in a region overlapped with the carbon nanotube
with semiconductor property through the insulating film,

wherein the first electrode is connected with the second electrode through
the carbon nanotube with semiconductor property in the carbon nanotube
20 semiconductor device.

5. A method of manufacturing a carbon nanotube semiconductor device
according to claim 4, further comprising:

forming an alignment film over the first electrode, the second electrode, and
25 the region between the first electrode and the second electrode; and

rubbing a surface of the alignment film.

6. A method of manufacturing a carbon nanotube semiconductor device according to claims 1, wherein a frequency of the alternating current voltage is equal to or larger than 1 MHz.

5 7. A method of manufacturing a carbon nanotube semiconductor device according to claims 4, wherein a frequency of the alternating current voltage is equal to or larger than 1 MHz.

8. A method of manufacturing a carbon nanotube semiconductor device
10 according to claims 1, wherein a concentration of carbon nanotubes contained in the carbon nanotube solution is equal to or lower than 0.0005%.

9. A method of manufacturing a carbon nanotube semiconductor device according to claims 4, wherein a concentration of carbon nanotubes contained in the
15 carbon nanotube solution is equal to or lower than 0.0005%.

10. A method of manufacturing a carbon nanotube semiconductor device, comprising:

forming a gate electrode over a substrate;
20 forming a gate insulating film over the gate electrode and the substrate;
forming a source electrode and a drain electrode over the gate insulating film;

applying a carbon nanotube solution comprising a solvent, a carbon nanotube having conductor property and a carbon nanotube having semiconductor
25 property over the source electrode, the drain electrode and a region of the gate insulating film between the source electrode and the drain electrode and overlapped

with the gate electrode;

applying an alternating current voltage between the source electrode and the drain electrode in order to control the alignment direction of the carbon nanotube;

5 evaporating the solvent for forming a carbon nanotube layer connecting the source electrode and the drain electrode; and

applying a direct current voltage between the source electrode and the drain electrode in order to remove the carbon nanotube with conductor property.

11. A method of manufacturing a carbon nanotube semiconductor device
10 according to claim 10, further comprising:

forming an alignment film so as to cover the source electrode, the drain electrode, and the gate insulating film between the source electrode and the drain electrode; and

15 rubbing a surface of the alignment film.

12. A method of manufacturing a carbon nanotube semiconductor device, comprising:

forming a source electrode and a drain electrode over a substrate;

20 applying a carbon nanotube solution comprising a solvent, a carbon nanotube having conductor property and a carbon nanotube having semiconductor property over the source electrode, the drain electrode and a region between the source electrode and the drain electrode;

applying an alternating current voltage between the source electrode and the drain electrode in order to control the alignment direction of the carbon nanotube;

25 evaporating the solvent for forming a carbon nanotube layer connecting the source electrode and the drain electrode;

applying a direct current voltage between the source electrode and the drain electrode in order to remove the carbon nanotube having conductor property;

forming a gate insulating film over the carbon nanotube layer comprising the carbon nanotube having semiconductor property;

5 forming a gate electrode over the carbon nanotube layer through the gate insulating film.

13. A method of manufacturing a carbon nanotube semiconductor device according to claim 12, further comprising:

10 forming an alignment film so as to cover the first electrode, the second electrode, and the region between the source electrode and the drain electrode; and
 rubbing a surface of the alignment film.

14. A method of manufacturing a carbon nanotube semiconductor device
15 according to claims 10, wherein a frequency of the alternating current voltage is equal to or larger than 1 MHz.

15. A method of manufacturing a carbon nanotube semiconductor device according to claims 12, wherein a frequency of the alternating current voltage is
20 equal to or larger than 1 MHz.

16. A method of manufacturing a carbon nanotube semiconductor device according to claims 10, wherein a concentration of the carbon nanotube contained in the carbon nanotube solution is equal to or lower than 0.0005%.

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17. A method of manufacturing a carbon nanotube semiconductor device

according to claims 12, wherein a concentration of the carbon nanotube contained in the carbon nanotube solution is equal to or lower than 0.0005%.

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